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COAST SURVEY AND WEIGHTS AND MEASURES.

LETTER

FROM

THE SECRETARY OF THE TREASURY,

TRANSMITTING

A report of Professor Hassler, superintendent of the coast survey and work on the construction of standard weights and measures.

DECEMBER 22, 1842.

Referred to the Select Committee upon the subject.

TREASURY DEPARTMENT *December* 19, 1842.

SIR: I have the honor to transmit, herewith, a report made to this Department by Professor F. R. Hassler, superintendent of the coast survey, and of the work for the construction of standard weights and measures, showing the progress made during the present year in these works, respectively.

I have the honor to be, very respectfully, your obedient servant,

W. FORWARD,
Secretary of the Treasury.

Hon. JOHN WHITE,
Speaker of the House of Representatives.

Report of F. R. Hassler, as superintendent of the survey of the coast, and the construction of standards of weight and measure, upon the progress of these works in 1842.

The works of the coast survey have, since my report of 2d December of last year, continued in all the different branches, with steadiness and assiduity, the same as has always been habitual, on the part of every one engaged in the work, notwithstanding the difficulties arising from the nature of the ground, and other causes, which have required increased attention, and from the intermittent fevers, which have more or less attacked every party of the work at different times. This latter difficulty being local, and well known to increase in proportion as the work proceeds southerly, will, in a year or two, oblige to change the time of the year to be used for the field works, approaching it always nearer to the winter season; this will, however, make but a slight difference in the general organization of the

work, the nature of the changes that may arise from this, or any other accessary circumstances belonging to the detail administration of the work, are so much less to be detailed here, as they are only prospective, therefore, as yet, undeterminable.

The present organization of the work, being the same as since many years, is of course fully known; the grounds of it have been deduced in my numerous former propositions for the work, and the series of my yearly reports; it would therefore not be proper to dwell here again upon it.

The tasks executed by the last summer's works in the field, are as follows:

For the main triangulation: the extension of a more general scheme of larger triangles southerly on both sides of the Delaware, over those that have been made with the view to topographical and hydrographical use, and which forms their final element and union.

For the secondary triangulation: to extend preliminary triangles over the upper part of the Chesapeake, which will lead also to the discovery of a proper locality for measuring the second principal base line, and to complete the triangles about both sides of Delaware bay, establish those up to the neighborhood of the head of the tide waters of the Delaware river, about above Philadelphia, &c.

The plane-table parties have filled up the greatest part of the ground now intended to be surveyed on both sides of the Delaware, and in other parts of New Jersey.

One of the naval parties has continued the soundings in the Delaware, parallel with the works of the topographical parties on its shores; the other has been extending the soundings out of sight of land, in the quadrangle, which is formed between the coast and the parallels and longitudes of Block island and Cape Henlopen, forming the outer approaches of both the New York harbor and the Delaware bay.

This investigation was carried out till to the Gulf stream, and in soundings till 650 fathoms depth, keeping samples of the nature of the bottom below. The officer operating in this work, expressed his full satisfaction with the methods indicated to him, the means he was provided with for that purpose, and the results obtained.

The consideration of the peculiarity of these works can alone make them appreciate, the nature of the ground over which they extend, the marshes abounding on both shores of the river, and the great multitude, and variability of the channels, shoals, and other impediments, which the Delaware presents, multiply in an equal proportion, the works and the difficulties of them, thence the necessary care, assiduity, and exertions, for both the topographical and the naval parties in that part of the work.

It was of interest to find out the exact place, where the observations of the transit of Venus over the Sun, was observed in 1769, at what was then called Cape Henlopen; therefore, on my visit to that neighborhood, I made proper inquiry, and was very kindly shown the place by the oldest inhabitant of Lewiston, Mr. Rodney, formerly Senator for the State of Delaware in Congress, who recollected it, from his having been at the tents of the observers at the time, when he was about 5 years old.

This place was, therefore, determined by the topographical party operating in the neighborhood, and the results for the astronomical position of the place, will become comparable with that, which will result in time from the present survey.

In a great part of the early season, the weather was very much averse to the works; the fine weather in the fall, though favorable for the works, requiring no distant views, was far less so to the works of the main triangulation than its appearance would have led to expect; the constant dense fogs, particularly over the Delaware, which the greatest number of the large triangle sides, now in operation, are crossing, caused considerable loss of time.

A great desire having been manifested: that the engraving and printing of the map of New York might be accelerated, the necessary measures have been hastened, and in part accomplished, and the work proceeds properly, in the best manner, by four engravers, of whom each has his appropriate branch, as the proper organization of such works requires.

The maps resulting will be appropriated to give all the data that may be desired for any improvement in the harbors, or navigation of all the approaches and the neighborhood of that port, and also to the special simpler wants of the seamen approaching the port, in such form as fits him the best.

A copperplate printing press has also been procured, which has been employed hitherto, and will, also, for some time yet be employed, for the necessary intermediate proof sheets, by which the gradual progress of the work is successively tried and directed, with some improvements which will be added to it, it will then also serve for the ultimate execution of the final printing of the plates.

These operations require just as much the constant attention, and the eye of the superintendent, as any other parts of the works of the survey itself, therefore the whole must necessarily be carried on in the office of the coast survey itself, by an appropriated establishment.

Proper time, care, and an adequate portion of the appropriation, must of course be devoted to it, and much attention and time, is required to procure the various materials, as copperplates, paper, and others, of that superior quality, which can alone be considered as satisfactory for a work of the character which the coast survey shall, also in its outwards appearance, present to the public.

When I was in London, to procure the first instruments for the coast survey, having seen, (about 1812,) in Mr. Troughton's workshop, the operations of last finishing and dividing the instruments upon the engine, which necessitated yet the unscrewing of the circles from the axis, in the manner of the late Mr. Ramsden's dividing engine, which occasioned always necessarily a recentering of the instrument, I suggested to him another manner of constructing the dividing engine, thus:

In the habitual manner of ultimately finishing the axis of motion, and the plane of the circle's limb perpendicular to the same, by turning the instrument upon two points, without disturbing it in any way, it is habitual at the same time to draw the circles upon the limb, between which the divisions are intended to be made, these circles become thereby concentric to the motion around the axis. Of this circumstance I proposed to take advantage to place the instrument concentric to the dividing engine, by constructing the central part of the dividing engine so, as to admit the instrument to be divided, with its axis remaining fast to the circle, exactly so as the axis and the plane of the circumference had been adjusted finally upon the lathe, of which centrality the circles, traced upon the limb at last, form the accurate indicators.

With this view I proposed: that the centre of the dividing engine be made a hollow axis, of such size as would admit, within its central opening, the axis of any instrument of such diameter as are habitually divided upon engines, when the axis, or any other central part of the circle, is turned downwards, as must always be more or less the case. For the axis, or part central going upwards, the habitual distance between the two arms holding the tracing arrangement, will generally have room enough to admit its passage upwards.

The instrument being then placed flat upon the plane of the engine, will present the circles traced upon its limb, which have been made concentric with the axis, so that two compound microscopes can be placed over them, in such a manner as to make the wires of them constantly tangent to the circles traced upon the limb, when turning the engine around the whole circumference. The compound microscopes performing this, are attached to a bar crossing over the engine, attached to the bars holding the tracing arrangement, and perpendicular to it, they are adjustable to any diameter.

When, by the moving of the instrument upon the engine, the concentricity of the circles upon the limb, with the motion of the engine is obtained, the circle is made fast, by any means which its construction most conveniently presents, and is ready for dividing, in the habitual way. The rest of the engine is otherwise similar in any respect to that which the late Mr. Troughton has made, and described in the Encyclopedy of Brewster.

When I deduced these ideas to Mr. Troughton, he fully approved them, and when some time after Mr. Th. Jones, of Charing Cross, London, instrument maker to the King, came to him (in my presence) to ask for advise upon the manner in which he should construct a dividing engine, which he intended to make for himself, Mr. Troughton told him to make it according to my direction, which I then explained to him as above.

When, in 1832, the coast survey began again, it was found necessary that an establishment should be in it: to enable to keep the instruments required in it, always in good repair, not only, but also to construct entirely new ones; for this a dividing engine was evidently required, as the necessity to recur to any mechanician, not habituated to the wants of the coast survey work, would never give results appropriated to our use, and keep the work itself back by delays, which would be out of our control, and very costly.

Therefore the acquisition of such an engine was immediately authorized by the President, and in consequence it was ordered immediately, and upon my plan of the modified construction, which I have just described.

Mr. Troughton, and Mr. Simms, whom he had in the mean time associated with himself, received the order to that effect; but Mr. Troughton died before the engine was finished, and it ultimately arrived here in the course of last summer, after a delay, which affords again a proof: that, when a work is to be done, requiring mathematical accuracy to a high degree, and to an honorable useful result, the time to be consumed for it, can impossibly be limited, as little as the extreme care and assiduity.

The engine is unique in its kind in this country, and of great value even for the general progress of the art of the mechanicians in this country, besides the services the coast survey will derive from it.

With reference to the appropriation to be proposed to Congress for the coast survey for this session, I take the liberty to suggest the propriety: that it shall be again one hundred thousand dollars, which several of the

latter years have proved to be exactly adequate to the proper, and in proportion to its effect, and success in the results, most economical amount of expenditure; though it must be considered that it will have to provide for two spring's outfits of the going into the field of the surveying parties, and that the expenses are of course increased by the whole amount required for the engraving and printing of the map of New York, &c. But on another side, the nature of the field work will, it is hoped, allow some slight reduction in the amount of expenses; and that at the time the appropriation will be made, a small balance of the present appropriation may yet remain disposable.

Upon the standards of weight and measure.

My report of 5th April last, upon the liquid capacity measures, contains the most essential account upon the progress of these works, by presenting again a full finished part of this important work, and such an one, as it is evident, required the most delicate combination of elements of natural philosophy in its organization, and of most careful mechanical skill in its execution.

Since then, the works for the balances intended for the State Governments, have principally occupied the mechanical part of the establishment, the final adjustment of the dry capacity measures, of half bushels, will, as I have stated there, be begun as soon as the season will be favorable for it, their mechanical execution is complete.

For any fuller information upon this subject, its history, and general bearing, if desired, I take the liberty to refer to the account rendered to the Committee upon the Coast Survey, to whom that report has been referred in the last session of Congress.

F. R. HASSLER.

STATION PINE HILL, NEW JERSEY,
November 17, 1842.